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In a note on Mr. Edmonds' paper in the *Lancet*, he mentions that in July, 1809, immediately before the battle of Talavera, the French army consisted of 275,000 men, "of whom 61,000, or  $22\frac{1}{4}$  per cent., were sick." This is no doubt correct, but I have not met with any return giving so high a ratio.

The general average of the sickness in the French armies, both in Spain and Egypt, appears, so far as the returns can be trusted, to have been lower than that of the English; and the Duke of Wellington, in a despatch dated the 9th of June, 1812, expresses surprise that in Marshal Soult's army there should be only 4,869 sick out of a gross number of 68,200.\*

(To be continued.)

## NOTES AND QUERIES.

*Demonstration of Formula.*—Mr. SPRAGUE sends the following in further illustration of the problem he refers to:—

Mr. Hardy has given, in Vol II. of the *Assurance Magazine*, an elegant investigation of the problem—"to determine the present value of a reversion of £1 payable on the death of A (aged  $x$ ), provided he dies before another life, B (aged  $y$ ), or within  $n$  years after him." He deduces the following rule:—"To the value of a temporary assurance on the life of A, add the value of a reversion contingent on B surviving a life  $n$  years older than A, multiplied into the present value of £1 payable if A lives  $n$  years." The value of this reversion will be, when expressed in the ordinary notation,

$$\frac{M_x - M_{x+n}}{D_x} + \frac{D_{x+n}}{D_x} \cdot A_{\frac{1}{x+n \cdot y}};$$

and in using the formula, the value of  $A_{\frac{1}{x+n \cdot y}}$  is supposed to be tabu-

lated, as is the case in Mr. Gray's tables. It may be interesting to the readers of this *Magazine* to give a proof of the preceding formula, by the aid of simple reasoning without analysis. From the conditions of the problem, the chance of receiving the £1 is seen to consist of two parts: the first being that of A's dying within the first  $n$  years, in which case the sum is actually to be paid, whether B is alive or dead, at the time of A's death. The value of £1, to be received on these conditions, is, of course, the present value of a temporary assurance for  $n$  years on the life of A, or is  $\frac{M_x - M_{x+n}}{D_x}$ .

The other part of the value depends on A's living  $n$  years, and on the probability that at his death, after  $n$  years, B will either be alive or have been dead a less period than  $n$  years. This latter probability is the same as the probability that at A's death B was alive  $n$  years previously. Now, it will be seen that this probability is the same as that of a life  $x+n$  dying

\* *Despatches*, vol. ix., p. 223.

before a life  $y$ ; and the value of £1, to be received on that contingency, is  $A \frac{1}{x+n \cdot y}$ . This must be multiplied by the value of £1 to be received

if A lives  $n$  years, or  $\frac{D_{x+n}}{D_x}$ ; because, as we have seen above, the second part of the value of the expectation depends on this contingency.

If the column M is not given in the tables used, since  $\frac{M_x}{D_x} = A_x$  and  $\frac{M_{x+n}}{D_x} = \frac{D_{x+n}}{D_x} \cdot A_{x+n}$ , we may replace the formula given above by the following,

$$A_x - \frac{D_{x+n}}{D_x} \left\{ A_{x+n} - A \frac{1}{x+n \cdot y} \right\},$$

which will be found more convenient in the case supposed.

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*Mismanagement of Joint Stock Companies.*—Much of the mischief which has lately arisen in the management of Joint Stock Companies is to be attributed to the reckless manner in which the powers of the Board are constantly delegated, by the Board, to one or more members of it. The powers given by the proprietors of Companies to directors are usually very extensive and important, and are entrusted to several individuals for the very purpose of ensuring that all questions shall come before the whole of them, and shall be carefully considered and decided upon by the general body; and it is therefore evident that when these powers are put into the hands of one or two members only, the objects for which a Board is constituted are in a great measure defeated. Nothing is more common, notwithstanding, than to give the chairman or the chairman and deputy chairman of a Board—or than to allow them to assume, directly or indirectly—the attributes of the Board itself; and in this way a door is opened to all kinds of jobbing, chicanery, and mismanagement. In strict accordance with the theoretical constitution of these bodies, there can be no individuality. They exist only when assembled at a formal sitting, and on these occasions all questions of sufficient importance should be submitted to them. The moment they are dissolved, the carriage of the Company's affairs should rest with its officers, who should then become solely responsible for the due administration of them, and be prepared to give to the Board at its next sitting an account of their proceedings in the interval. Under such a system all the members of the Board are necessarily made aware of every matter of importance connected with the Company's affairs, and each member can express his opinion upon it; whereas, by means of the practice alluded to, not only may the knowledge of any particular transaction be easily suppressed, but even a separate current of affairs carried on, unknown to all but one or two members. As a general rule, the duties and powers peculiar to a chairman should be exercised only while the Board is sitting, and not on any account at other times; and if the power of the Board or any portion of it be on any occasion delegated to him or to a committee, it is of the utmost importance to the well being and safety of the concern that the limits and continuance of the power so transferred should be accurately defined, and a strict account required to be rendered to the other members of the manner in which it has been exercised.